GRENADA

REPORT

ON THE

AGRICULTURAL DEPARTMENT

FOR THE YEAR

1959.

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GRENADA

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SECTION I

WEATHER CONDITIONS

Rainfall :

Whereas 1958 was only slightly drier than a normal year, 1959 must be recorded as droughty on the mainland of Grenada and a severe drought was experienced in Carriacou. The dry season which normally runs March through May, extended with only light showers until July, and October was the only really wet month. The drought had an adverse effect on yields, on agriculture generally and was very unfavourable for the establishment of young plants in the field.

Monthly and annual rainfall, 1959, at all recording stations are given in Appendix 1. *Calliste* registered the lowest annual rainfall, 28.69 ins. and the highest, 144.22 ins., was recorded at *Grand Etang*.

Rainfall returns at the Department's recording stations 1959, and the average for 1948-1958 are hereunder :

Station	Rainfall Inches 1959	Average for 1948—1958
1. Botanic Gardens	60.56	82.99
2. Mt. Moritz Agricultural Station	68.59	82.76
3. Tivoli Agricultural Station ..	45.82	75.20
4. Westerhall Agricultural Station	48.39	65.12
5. Ashenden Cocoa Station ..	76.16	109.29
6. Boulogne Cocoa Station ..	59.63	84.35
7. Maran Cocoa Station ..	87.22	104.58
8. Mt. Horne Cocoa Station ..	63.27	87.96*
9. Mirabeau Nurseries ..	62.69	—**
10. Grand Etang	144.22	151.65

Worthy of mention is the fact that total annual rainfall at Ashenden, Boulogne and Mt. Horne Stations was the lowest ever recorded at these stations.

Windstorms in May, June, July and October adversly affected banana production. Most of the damage occurred in the western and eastern agricultural districts.

*Average for 1953-1958.

**The first year for which complete returns exist is 1959.

SECTION II

PRODUCTION

1. Major Crops :

Cocoa.—Cocoa production continued its post Janet climb to recovery and 37,875 cwts. of beans were exported in 1959. This represents an increase of 9,688 cwts. over the 28,187 exported in 1958, and brings yield to 74 per cent. of the last pre-Janet (1954) crop. The United Kingdom, which purchased 13,276 cwts., remained the largest buyer of local cocoa followed in order by Belgium, West Germany, Holland and Australia. Cocoa exports, 1950-1959, and the dollar value of the crops are presented in table II below :

Table II—Cocoa Exports

Year	Export (cwts)	Value $
1950 ..	40,227	2,434,634
1951 ..	48,504	3,576,116
1952 ..	54,178	3,537,395
1953 ..	61,128	3,825,773
1954 ..	51,362	4,959,403
1955 ..	47,327	4,158,807
1956 ..	11,400	650,187
1957 ..	23,308	1,387,778
1958 ..	28,187	2,297,468
1959 ..	38,016	2,739,777

Prices paid to growers for cocoa were low and fluctuated between 12 cents and 16 cents per lb. for wet cocoa and between 42 cents and 52 cents per lb. for estate grades.

Although there was a 33 per cent. increase in production, the comparatively low prices obtained led to only a 20 per cent. increase in dollars earned. The increase in cocoa earnings, accompanied by a decrease in nutmeg and mace exports and prices permitted cocoa to regain first position as regards dollars earned—a position it held unchallenged from 1951-1955.

Nutmeg and Mace :—For 1958 and 1959 the quantities of nutmeg and mace purchased at the Grenada Co-operative Nutmeg Association's receiving centres were as follows :

Nutmeg and Mace	1958 (lbs)	1959 (lbs)
Cured in shell ..	329,663	578,881
Grinders	7,574	8,876
Uncured in shell ..	1,216,038	1,805,081
Whole Mace ..	111,306	193,508
Broken Mace ..	21,472	38,290

The table below gives the quantity and dollar value of nutmeg, mace and nutmeg oil exported for he period 1950-1959 :

Year	Nutmeg (cwts.)	Mace (cwts.)	Nutmeg Oil (lbs.)	Total Value $
1950 ..	61,947	6,515	6,280	3,796,488
1951 ..	23,152	5,199	5,040	2,199,514
1952 ..	44,607	6,886	3,140	2,334,987
1953 ..	37,082	7,505	10,260	2,328,894
1954 ..	48,881	7,439	4,050	2,935,227
1955 ..	52,887	6,478	6,570	2,934,609
1956 ..	35,626	1,169	2,385	3,946,701
1957 ..	3,329	1,308	—	1,774,837
1958 ..	13,017	1,363	—	4,542,659
1959 ..	10,578	1,083	—	2,373,133

Exports of nutmeg and mace were 19 per cent. lower in 1959 as compared with 1958. This decrease coupled with the anticipated decline in prices caused a dramatic fall in the total dollars earned by the industry and as a result the industry slipped from first to second place.

The decline in price, which occurred during the year, increased the range in prices offered during 1959 as compared with the rather steady prices obtained in 1958. Sound unassorted nutmeg fetched from $2.06 per pound to $3.54 per pound while defectives sold in the range $1.20 to $2.16. Whole mace prices fluctuated between $4.32 and $5.28 per pound while broken mace and pickings, which in 1958 had fetched between $3.60 and $4.80 per pound, were sold during 1959 within the wide range of $0.72 to $4.80 a pound.

In 1959, advance prices offered by the G.C.N.A., were the same as for 1958 :—

Uncured Nutmeg	25c. per lb.	Whole Mace	$1.20 per lb.
Cured	38c. per lb.	Broken	.60 per lb.
Defective	12c. per lb.	Siftings	.30 per lb.

In 1959 the Grenada Co-operative Nutmeg Board in keeping with normal practice released an end-of-year bonus payment to producers. The bonus is met from the difference between advance and final price on the crop.

Bananas.—In 1959 a total of 1,151,543 stems valued at $1,755,596 was exported to the United Kingdom. Banana exports and the dollar value of crops for 1953-1959 are given below :—

Year	Stems exported	Weight (tons)	Average Weight per stem (lbs.)	Value $
1953 ..	49,863	—	—	51,089
1954 ..	108,900	—	—	189,237
1955 ..	92,243	—	—	139,500
1956 ..	67,115	—	—	138,500
1957 ..	568,841	7,817.0	30.8	1,387,778
1958 ..	947,893	11,715.76	27.7	1,752,340
1959 ..	1,151,543	13,835.06	26.8	1,755,596

A total of 24,021 stems or just over 2.1 per cent. of all fruit offered was rejected at the pier. This reflects a marked improvement in quality of fruit offered for sale as compared with last year when rejects totalled 3.9 per cent.

It is now possible to estimate with considerable accuracy the long term position of the banana industry in the island's economy. Dollar wise, banana is the island's third most important industry, and production appears to have reached a peak in the vicinity of 1.2 million stems valued at nearly two million dollars.

The average weight per stem dropped a further one pound and this may indicate the need for improved cultural practices including replanting. Losses from windstorms have been high and efforts must be made to keep planting at least abreast of losses.

The average price for export bananas in 1959 was 5.6657c., this is somewhat below the 1958 average. A review of the prices received during 1959 shows a minimum of 3.2875c. per pound for January and February, and a maximum of 6.2875c. per pound paid from late March to late December.

Sugar, Molasses, Rum.—Sugar production in 1959 registered a further sharp decline. Presented below are tons sugar manufactured and tons cane per ton sugar at the Grenada Sugar Factory Ltd., for the period 1950-1959 :

Year	D.C. Sugar Produced Tons	Tons Cane/Tons Sugar
1950 ..	1,687	10.31
1951 ..	2,779	11.94
1952 ..	1,929	11.11
1953 ..	2,108	10.58
1954 ..	2,527	10.43
1955 ..	2,470	9.65
1956 ..	1,403	11.20
1957 ..	2,221	9.87
1958 ..	2,002	10.95
1959 ..	1,344	9.66

The decline in sugar production was even more marked than anticipated. Estimating local D.C. sugar requirements at 2,400 tons, the yield of 1,344 tons was only 55 per cent. of the island's requirements. Because of this year's drought, the 1960 crop will be yet smaller. During the year efforts were made to boost interest in the industry and large quantities of cane plants were distributed to small farmers free and/or at reduced rates. It is hoped that there will be an increase in production by 1961.

Of the 13,254 tons cane milled, 12,974 tons were converted into sugar and 280 tons were diverted to rum production.

Molasses.—Production of molasses declined to the point that none was exported in 1959. The 59,000 gallons produced was sold on the local market at 10 cents per gallon or converted at the factory into white rum.

Rum.—The Grenada Sugar Factory Ltd., and small distilleries produced 85,441 gallons of white rum for the local market.

Year	Rum Produced
1955	86,194
1956	80,436
1957	91,395
1958	91,798
1959	85,441

Copra and By-Products.—The Tempe Manufacturing Company Ltd., milled 454 tons of copra in 1959 to produce 54, 118 gallons of refined oil and 243,400 lbs. of laundry soap; 276,700 lbs. coconut meal was sold to local stockmen. Although figures show a decline in production compared with 1958, nevertheless yield compared favourably with that for the other years listed in the table below :—

PRODUCTION

Year	Copra Milled	Refined Oils (Gals.)	Laundry Soap (lbs.)	Coconut Meal (lbs.)
1954 ..	—	24,840*	371,850	286,500
1955 ..	—	32,028	317,550	245,800**
1956 ..	—	38,878	68,050	225,480**
1957 ..	—	27,555	170,800	194,700
1958 ..	—	51,118	305,100	326,780
1959 ..	454	54,118	243,400	276,700

*In addition, 17,408 gallons of crude oil were produced and exported to Barbados.

**Meal produced for one month not available ; an estimated figure based on copra milled was inserted.

During January, the price of copra was upped from 11¾c. to 12½c. per pound but the ex-factory price of refined oil remained unchanged at $3.00 per gallon. Laundry soap sold at $8.75 per box of 50 lbs. and coconut meal was up one cent from 4 c. to 5 c. per lb.

As in the previous year germinated seed-coconuts were distributed free in 1959 in an effort to effect an increase in the acreage under this crop but it is abundantly clear that field management of coconuts is very casual, and in the years ahead the extension service will have to redouble attempts to encourage farmers to fertilize and care coconut cultivations.

Limes :—There was a significant increase in the amount of lime juice exported. This, coupled with the increase of prices of juice contributed to the marked increase in the estimated value of this crop by post Janet standards. About 48.000 gallons of raw juice was shipped to Trinidad at 75 cents per gallon c.i.f. The remainder went to Dominica.

Only 1,479 lbs. of lime oil were manufactured in 1959. Of this, 409 lbs. were made on the mainland and 1,070 lbs. were produced at Dumfries, Carriacou. Prices obtained on the U.K. market averaged in the vicinity of $11.64 per lb. The total value of the manufacturing industry, has been calculated at $82,665.00. The table below gives 1952-1959 production of lime juice for Carriacou and Grenada along with the estimated total dollar value :—

Year	Lime Oil (lbs.)	Lime Juice (Gal.)	Total Value $
1952 ..	4,018	133,080	92,542
1953 ..	7,068	83,280	99,585
1954 ..	10,270	1,600	64,600
1955 ..	3,631	23,480	33,488
1956 ..	460	33,520	10,786
1957 ..	1,357	19,460	19,599
1958 ..	1,751	38,480	44,868
1959 ..	1,479	87,270*	82,665*

*Estimate only.

A small trade in green limes is maintained with Trinidad.

Cotton.—In 1959 only 876 cwts. of lint was produced. All local cotton was exported to Trinidad and originates in Carriacou. For further information on this crop see Section IV.

2. Minor Crops.

Coffee.—The establishment of coffee as a crop is in progress and during the year nearly 113,000 seedlings were distributed for planting as vegetative barriers on the contour and as borders to cocoa, banana and nutmeg fields. Robusta seedlings constitute the bulk of coffee plants released and it is anticipated that small quantities of coffee will be harvested for sale on the local market from 1961 onwards.

Pineapples.—A fair quantity of pineapples ripened from limited plantings undertaken in 1957 and efforts were made to secure an outlet at remunerative prices in neighbouring islands. Eventually the fruit was all consumed locally, at an average retail price of 8c. per lb. Producers have lost interest in expanding production and there is every evidence that cultivation will be neglected.

Miscellaneous Fruit Trees.—Sapodillas, golden apples, Jamaica plum, mangoes and avocado pears were in fairly good supply in their respective seasons.

3. Foodcrops.

The supply of foodcrops in Grenada was adversly affected by the severe and prolonged dry season. In addition, from September foodcrops had to be shipped to Carriacou in considerable quantity to alleviate the near famine there. Bluggoe is the staple item of food in an average low income diet and at 3c. per lb. this was perhaps the only cheap source of starch. The corn crop was poor but yams and pigeon peas yielded well. Sweet potato, tannias, eddoes and dasheen were in fair supply early in the year but fell off towards year's end as the drought curtailed new planting.

Crops of fresh and green vegetables such as cabbage, lettuce, carrots, tomatoes, etc., were also hampered by the droughty conditions and perhaps with the exception of lettuce, supply was unreliable.

Retail prices at St. George's market are given hereunder :—

Crop	Prices (St. George's Market)
Corn Meal	20c. per lb.
Black eye peas ..	30c. ,,
Split peas	25c. ,,
Green peas (in pod) ..	10—16c. ,,
Pumpkin	6— 8c ,,
Yam	8—12c. ,,
Sweet potato ..	10—16c. ,,
White or English potato	15—16c. ,,
Bluggoe	3c. ,,
Green banana ..	3— 4c. ,,
Ripe plaintain ..	12—20c. ,,
Breadfruit	4— 8c. each
Dasheen	8—15c. per lb.
Eddoe	10—16c. ,,
Tomato (large) ..	40—50c. ,,
Tomato (small) ..	40—48c. ,,
Carrots	36—56c. ,,
Cabbage	20—36c. ,,
Lettuce	8—10c. per bunch
Grapefruit	6c. each
Orange	5c. ,,
Avocado pears ..	8—16c. ,,
Calaloo	8c. per lb.

LIVESTOCK

Cattle.—There were no siginificant changes in the livestock industry during the year. Some progress was made in the efforts to lift the ban on export of animals for the Trinidad market but by the year's end negotiations had not been completed.

The Revolving Herd Scheme launched by Government in 1958 was continued and expanded with the purchase of an additional 26 heifers and cows during 1959. Under the scheme, farmers are loaned heifers or cows in calf and when female calves are born these become the property of the farmers at weaning. The cows are then bred again and loaned by Government to other farmers.

Baillies Bacolet estate continued to steal the limelight with an A.I. programme using frozen semen (Jersey and Holstein) imported from Canada. Healthy calves with very good conformation have been secured and it is anticipated that by end of 1960 about 100 "frozen semen" calves will be on this farm. The department's revamped A.I. Service for 1960 provides for the use of imported frozen semen.

Hogs.—Lack of cheap concentrate feed and the existing restrictions on export of meat to Trinidad have continued to hamper possible development of a hog industry. Efforts to lift the ban on exports are making headway and by all indications restrictions will be relaxed by 1960. Large Black hogs or crosses including this breed continue to be the popular type reared.

Sheep.—Rearing of sheep continued to be popular in Grenada, primarily among small farmers. Efforts by a few local breeders to improve the quality of stock has prompted recent importations of Black Headed Persians from Tobago and Antigua and these animals made good progress. Crosses of Persians on creole sheep are proving very satisfactory.

Goats.—The keeping of goats for milk is apparently becoming more popular and there are indications that the goat population is increasing. However, quality breeding stock is still scarce.

Poultry (chicken).—Efforts to build a poultry industry capable of satisfying all local needs are afoot but progress continues to be slow. There are only three or four large producers and most producers keep only small flocks of ten to twelve birds.

The Poultry Multiplication Scheme which has been in operation since 1948 was modified late in the year and is now known as the Poultry Improvement Scheme. The new emphasis is on the maintenance of a small stock of high quality birds to assist progressive breeders maintain quality in their flocks by supplying cockerels of high laying strains. Under the old scheme the emphasis was on the production of day old chicks for sale to small producers but it is now expected that all poultry rearers will import their own chicks in the future.

During 1959 the scheme produced 6,374 chicks. The local poultry industry did not suffer any major outbreaks of disease during the year under review.

Pasture and Fodder Grasses.—Little progress was made in the expansion of the acreage under Pangola grass, this largely because of the extended drought which was most pronounced in the major livestock area in the dry southern belt of the island. One estate has used overhead irrigation on pangola pasture most successfully and a few other estates are expected to follow suit by 1960.

Meat.—Local meat (beef, pork and mutton) was in fair supply throughout the year. There were no price changes in 1959 and butchers at the St. George's market retailed cuts at 66c. per lb.—the same price that obtained in 1958.

Milk.—Much of the milk produced locally is retailed by vendors or by the individual cattle owner and no accurate production data is available. Dairy milk is sold at 18c. per pint and vendors' milk at 8c. per pint.

Demand is considerably in excess of production and large quantities of milk are imported.

FISH

Records of fish landing at five major centres placed the 1959 catch at 1,671,574 lbs. this being nearly 500,000 lbs. more than the 1,199,434 lbs. reported for 1958.

Despite efforts to develop the local industry the supply of fish landed is well below demand and as in the past imports have been considerable.

SECTION III

WORK IN THE DEPARTMENT

Extension Services

(*i*) *Organisation.*—Twenty-seven Agricultural Instructors working under the supervision of five District Agricultural Assistants, comprised the staff of the Extension Services Division of Carriacou and of the four Extension Districts into which Grenada is divided.

4-H work among rural youth was introduced as an integral part of the Extension Services activities in June when the newly appointed 4-H Organiser returned from a training course in Puerto Rico and began promotional work in schools and in collaboration with Farmers' Clubs. By the end of the year, twelve 4-H Clubs had been formed, three of which had qualified for formal recognition and were officially declared open. Of the three Clubs, two were formed in connection with schools while the third was sponsored by a Farmers' Club.

(*ii*) *Training.*—In-service training of extension personnel is essential for an extension service of improved efficiency and the emphasis placed on continuous training within recent years was carried on in 1959. Specialist Officers conducted one-or two-day courses in recent developments in Soil Management, Field and Animal Husbandry.

One Agricultural Instructor returned in June from the Eastern Caribbean Farm Institute after successfully completing the two-year course of that Institute and was assigned duties in the Cane belt Two Agricultural Instructors were selected and entered the Eastern Caribbean Farm Institute in September to take the 1959-61 course of training.

The Officer-in-Charge of Extension Services attended a four months training course in Extension Administration and Methods sponsored by the International Corporation Association and conducted at the University of Puerto Rico and Michigan State University. He also visited Jamaica in order to study and observe that island's Co-ordinated Extension Services Committee at work.

The Senior Agricultural Assistant Carriacou was away during the last three months of the year attending a three months course in Agricultural Extension Methods and Soil Conservation in Puerto Rico, sponsored by the International Corporative Association.

Of the eight young men who attended the 1958-59 Agricultural Apprenticeship Training Course, six successfully completed the training. Six new Apprentices were taken on in October in the 1959-60 Apprenticeship Course.

(*iii*) *Programme Planning.*—In an effort to continue improvement of the efficiency of Extension Services, a new feature, Programme Planning, was introduced in January 1959. Six Extension Programme Planning Committees were set up in Grenada in order to ensure farmers' participation in planning extension programmes that would better meet the wants of the farming public. One committee was set up in each of the Districts; North, West and South, and three in East Grenada. Estate managers and small farmers selected as delegates from Farmer Organisations in each district, sat on these committees along with the members of the Extension Staff and planned a programme for 1959 based, as far as possible, on the needs and interests of farmers. Further meetings were held during the course of the year in order to review the progress of the work in keeping with plans. Committe members showed interest in the work of their committees and it was felt that a very useful start has been made in this direction.

(*iv*) *Extension Methods.*—Farm visits continued to be the chief method of approach used by the Extension Officers in carrying education and service to farmers. During the year a total of 8,422 farm visits were paid and help and instructions given on a wide range of farm activities including the preparation of fields for planting clonal cocoa, the planting and after-care of tree crops, the cultivation of lacatan bananas, the reaping, handling and preparation for market of lacatan bananas, the care and management of livestock and soil conservation measures.

The establishment of "model plots" of cocoa, nutmeg and bananas on estates was continued from 1958, while the development, for the purposes of demonstrations, of "key farms" owned and operated by progressive small farmers was maintained at a satisfactory level.

Teams of Senior Extension and Specialist Officers continued to visit estates on the invitation of managers in order to assist management in preparing development programmes for the estates.

Extension personnel attended a total of 219 meetings at which various subjects of farming interest such as pangola grass planting, rotational grazing and food production were discussed. During the year 78 tours were conducted on both estates and small farms by members of the Extension Services.

Another innovation in 1959 was a weekly radio broadcast feature over the Windward Islands Broadcasting Service. "Farm News" lasts for five minutes and consists of items of news which are considered of interest to the farming public. By the end of the year 35 broadcasts had been made.

(*v*) *Evaluation.*—Plans to begin the evaluation of some aspects of extension work did not, unfortunately, fructify. It is proposed, however, to start a limited amount of evaluation of extension in 1960.

DISTRICT AGRICULTURAL STATIONS AND THE BOTANIC GARDENS

Three of the four mainland agricultural extension districts maintain small agricultural stations : Westerhall (south), Mt. Moritz (west) and Tivoli (north).

Westerhall Agricultural And Livestock Station

Westerhall is the livestock station of the department. Here pangola grass is grown not only for grazing animals but also to supply planting material for distribution to farmers.

Cattle.—In an effort to maintain the Station's herd throughout the year on the Station's pasture, the number of head was drastically reduced from thirty on 31st December, 1958, to ten by the end of 1959. Plans to extend the acreage under pangola grass pasture are being implemented. On 31st December, 1959, the composition of the herd was as follows :—

Bulls	..	..	4
Cows	..	..	6
Total	..	..	10

Births : Eight calves were born during the year.

Deaths : One heifer and one bull died.

Sales : Three bulls, five cows, three heifers and seventeen calves were sold.

Milk.—The reduction in animals caused a reduction in milk production which fell by just over 2,000 quarts to 7,288 in 1959. Milk substitutes were widely fed to the calves and 5,898 quarts of milk, a much higher proportion than normal, was sold as fresh fluid milk. Production of butter also declined sharply and only 94¼ lbs were made from 712 quarts of milk.

Hogs.—High quality large black hogs are maintained on the station mainly to produce breeding stock to be sold to members of the farming community. Piglets are weaned at eight (8) weeks and are sold at ten dollars ($10) each. In all, 131 animals were sold of which 121 were piglets. At the year's end the herd included :

Boars	..	..	3
Sows	..	..	15
Gilts	..	..	2
Piglets	..	..	51
Total	..	..	71

Twenty one (21) litters, the same as in 1958, were born during 1959. Piglets born averaged 8.4 per litter and an average of 6.8 piglets were weaned. However, the average weaning weight, 28 lbs., was below that obtained in recent years.

Goats.—Four ewes and one buck were maintained on the station. These animals are kept to produce stock for the various stud centres as well as for service.

Sheep.—One South African Woolless ram was maintained for service.

Stud Centre.—The number of services for the various classes of studs at the Westerhall Station were as follows :

Boar	.. ..	140
Buck	.. ..	13
Ram	.. ..	3
Total	..	156

Poultry.—(Poultry Multiplication Scheme and Poultry Improvement Scheme). The Poultry Multiplication Scheme was operated along routine lines until October. Until then pens of birds of two breeds, Rhode Island Reds and Barred Plymouth Rock, were maintained to provide eggs for the incubator at the Botanic Gardens. Chicks from this incubator were for sale to farmers at 50 cents each. Since October it was decided to change the aims and the name of the scheme which is now called the "Poultry Improvement Scheme". The scheme will no longer concentrate on the production of chicks and every encouragement will be given to the importation of day old chicks. Although a small number of chicks will still be produced for sale the new scheme has as its objective the production of well bred cockrels which will be sold to farms for the purpose of up-grading flocks. By 31st December, the flock at Westerhall had been reduced to only sixty-three (63) hens of one breed—Rhode Island Red. Six high quality Rhode Island Red cockrels are being imported for the further implementation of the new scheme.

At year's end the station's flock comprised :

Roosters	.. ..	6
Hens	.. ..	63
Chicks	.. ..	29
Total	.. ..	98

Eggs.—Production :	Eggs on hand 1st January, 1958		383
	Eggs layed 1959	.. ..	27,027
	Total	.. ..	27,410
Disposal :	Eggs incubated	.. ..	10,701
	Eggs used by A.I. Scheme	..	159
	Eggs broken	.. ..	748
	Eggs sold ..	.. ..	15,687
	Eggs on hand 31st December, 1959		115
			27,410

The Brooders.—From the 10,701 eggs incubated 6,622 chicks hatched representing 61.9 per cent of the total number of eggs incubated. This return is significantly higher than that of 1958 when an unusually low return of 49.4 per cent was obtained. Of the 748 broken eggs listed in the above table; 425 were sold as cracked at 6c. each.

Mt. Moritz Agricultural Station

Six acres of the station's land was released for a government sponsored house and garden settlement. The total area of the station is now approximately 14¼ acres.

Orchard Crops.—The cocoa and citrus plots were maintained in fair condition despite the adverse weather conditions which killed many of the young citrus plants put in last year. Trees bore well. The banana plot suffered severely from the drought and was finally abandoned.

Foodcrops.—Good yields of corn, pigeon peas, yam and sweet potato were obtained. For all these crops the area planted to the 1959-60 crop was considerably less than the 1958-59 crop. Plots of eddoes, tannia and manioc also bore well and large plots of these crops were established for the 1959-60 season.

Vegetables.—Plots of tomato and lettuce yielded well but the cabbage crop was very poor. New plantings of carrots and tomatoes were in fair condition at the end of the year.

Experiments.—The sweet potato variety trial (5 randomized blocks) planted September 1958 was reaped February 1959 at 5 months old. Sixteen varieties of locally grown potatoes were tested. The soil type on which the experiment was located is Concord Clay or Clay Loam which is redish brown in colour. The topography was a moderately steep hill slope, 15 degrees by 20 degrees, and this site was moderately eroded.

Planting was in rows four feet apart with the vines two feet apart in the row. No fertilizer was applied. Mt. Moritz enjoys an average rainfall of 82 inches per annum but 1959 was a dry year and total precipitation for the period the experiment run was 42.14 inches.

The experiment was established in co-operation with Mr. Gooding, Plant Breeder for the Regional Research Centre, Trinidad, and each potato variety was given an Accession Number.

Results of the experiment are given below :

Variety	Accession No.	Total Yield	Marketable Yield
1. Justin	G.S.P. 11/56 —	89 lbs	83 lbs
2. Black Rock ..	G.S.P. 19/56 —	77½ „	73¾ „
3. Poorman's Friend	G.S.P. 16/56 —	75½ „	68¾ „
4. Mocho ..	G.S.P. 09/56 —	67 „	57¾ „
5. Eldica	G.S.P. 08/56 —	66¼ „	58½ „
6. V. 14 ..	G.S.P. 03/56 —	63 „	59 „
7. Sealy	G.S.P. 12/56 —	63 „	57½ „
8. Jones	G.S.P. 15/56 —	62½ „	57¾ „
9. Elmo	G.S.P. 14/56 —	59¾ „	54 „
10. Georges ..	G.S.P. 04/56 —	56¼ „	49 „
11. Pumpkin ..	G.S.P. 05/56 —	53¾ „	48 „
12. Six Weeks ..	G.S.P. 06/56 —	48½ „	42¼ „
13. Barker ..	G.S.P. 17/56 —	40 „	35¼ „
14. Brass Cannon ..	G.S.P. 13/56 —	31¾ „	29 „
15. Montserrat ..	G.S.P. 22/56 —	22¼ „	18 „
16. Barbados ..	G.S.P. 24/56 —	21¾ „	17¾ „

The experiment is intended as one of a series and the results should not be considered as conclusive. However, three varieties, Justin, Black Rock and Poorman's Friend yielded well and should be favoured when planting under conditions akin to those under which the experiment was carried out.

No further trial was established but the tested varieties were established in Multiplication Rows so as to be available for subsequent testing.

An observation trial on twelve (12) varieties of local pigeon peas was carried out. Each variety was set in a block of 48 holes to facilitate further observation and multiplication by selfed crosses. Selfed seeds of each variety were again planted out in separate plots.

Livestock.—On 31st December there were seven animals on the station :—two (2) cows, three (3) calves, one (1) boar and one (1) buck goat. The Barbados Black Belly ram died during the year. A boar died a few days after its arrival from Maran and was replaced.

Services for the year were :

Boar	19
Buck	7
Total	26

Buildings.—During the year the boar pen and ram shed were pulled down and rebuilt and the buck shed renovated.

Tivoli Agricultural Station

Orchard Crops.—The cocoa and banana plots were maintained satisfactorily thououghout the year, and bearing was reasonably satisfactory in spite of the drought.

Pastures.—The three grass plots on the station suffered severely from the prolonged drought and were never up to their usual standard.

Livestock.—The stud centre at this station included : a boar, a ram and a buck goat. One cow was maintained. Services of the various classes of studs at Tivoli during the year were :

Boar	21

Botanic Gardens

The limited rehabilitation of the gardens planned for 1959 was successfully carried through and included :

1. Construction of a rubble wall and concrete drain along the main roadway.
2. Rebuilding of three concrete platforms in the nursery.
3. Renovation of the Greenhouse.
4. Laying down of a concrete floor for the fernery and three concrete passages in the nursery.
5. Refencing the nursery and erecting iron gates.
6. Erecting an additional propagator.
7. Replacing a structure destroyed by hurricane 'Janet' by a much more elaborate summer-house. It is hoped that funds will be made available for renovating the paths and replacing seats throughout the gardens.

Maintenance.—Efforts were made to improve the general appearance of the gardens which had never recovered from the set back by the 1955 hurricane. Old tree stumps were hauled away and numerous annuals and perennials were reintroduced.

Propagation.—Reorganisation and expansion of plant propagation in the nursery was successfully carried through despite the very severe drought and a much larger number of plants were produced than in recent years. The demand for plants for private gardens increased tremendously and indications are that the demand will continue to increase for sometime, as a result of Annual Garden Competitions and Flower Shows now being run by the Y.W.C.A's Town Beautiful Circle.

A total of 3,327 plants were released from the propagator as compared with 1,250 for 1958. Of this total, 102 were planted in the Botanical Gardens, 463 were planted on Crown Lands at Fort George, Queen's Park, Tanteen, the Cemetery, the Lagoon and the Colony Hospital. A further 90 were transferred to other agricultural stations and government residences. Private gardens purchased 2,672 plants.

Horticulture Activities.—The staff in the nursery maintained close contact with enthusiastic private gardeners. At a more official level considerable work was undertaken to establish flowering plants at Fort George, the Colony Hospital and Tanteen. Unfortunately the very adverse weather conditions frustrated most of the efforts.

SPECIALIST SERVICES

Cocoa Industry Improvement Scheme
Investigational Programme

Clonal Trials on Stations.—The year under review was the eleventh for the clonal trials planted on the three Cocoa Stations (Mt. Horne, Ashenden and Maran) in 1948. From the yield recorded during the period 1958/59 these trials can safely be regarded as having completely recovered from the set back experienced during the hurricane of 1955.

Fertiliser Treatments.—The trials were given two equal applications of mixed fertiliser (N.P.K/12.8.24) with extra treatments of N,P and K during the current year. A total of 2 lbs of the mixed fertiliser plus a ½lb of N,P or K were applied to each clonal tree in the experiment. The rate of fertiliser and time of application are given in the table below.

Table showing the dates of application and the rate (in pounds) of fertiliser applied to the clonal trials at Mt. Horne, Ashenden and Maran Cocoa Stations respectively :—

Clonal Trials	Date of Application/Replication 1st	2nd	No.	Rate (lbs) of Fertiliser per tree per application — Mixed Fertilisers N,P,K/12.8.24	Extra Fertiliser N(S/A)	P(T/S)	K(S/P
Mt. Horne	8.6.59	14.12.59	1x	1	—	¼	—
	do	do	2x	1	¼	—	—
	do	do	3y	1	—	—	—
	do	do	4y	1	—	—	½
Ashenden	16. 6.59	16 & 17.12.59	1x	1	—	¼	—
	do	do	2x	1	—	—	¼
	do	do	3y	1	—	—	—
	do	do	4y	1	¼	—	—
Maran	15.6.59	9.12.59	1x	1	¼	—	¼
	do	do	2y	1	¼	—	¼
	do	do	3z	1	—	—	—

Cultural Operations.—The cultural operations during the year consisted mainly of weeding in the wet season, pruning, de-suckering and staking when it was thought necessary, cleaning of contour drains on the onset of the rains and opening of root drains to preclude competition between clones in the trials and the trees in the surrounding hedges and windbreaks for moisture and nutrients.

Pest and Disease.—The main pests which attacked the foliage and branches of the clones during the year were Thrips (Seleno thrips rubrocinthus), mealy bugs (Pseudococeus citri) and beetles (Steirastoma breve).

Thrips' attacks were particularly serious throughout the drier months of the year and continued during the rainy season which was in fact fairly dry. In an effort to control this insect pest regular insecticidal sprayings were applied at 3-weekly intervals. At first a mixture of Agrocide in water was employed and was later replaced by a Didimac, Gammexane Emulsion Concentrate and Agral in water mixture. Both of these spray mixtures proved unsuccessful for the control of thrips and mealy bugs. Full control of these pests, however, was later effected by regular low volume applications of a Dieldrin in water mixture.

Signs of attack by beetles were noticed at various sections of the trials at Mt. Horne, especially during the months of August and September but the attacks were effectively controlled by the Dieldrin sprays.

The incidence of Phytopthora (P. palmivora) on both young foliage and pods (Black Pod) was high in all the clonal trials during the humid months of September to December. Phytophthora which gives rise to a marginal and tip necrosis of the leaves of young flushes was particularly severe during the month of October in which the highest monthly rainfall for the year was recorded. Efforts were made to control the disease on the foilage by low volume spray applications of a copper fungicide, Perenox, in water which at first proved ineffective. The sticker and dispersive agent Agral was, however, added to the Perenox-water mixture and control was partially achieved.

Clonal Yield.—Yield for the crop year 1958/59 by far exceeded that of the 1957/58 crop and was the highest ever recorded since the analysis of yield data commenced. The high yields recorded for this year in the three clonal trials are indicative of the rapid and total recovery made by the clones which were adversely affected by the hurricane four years ago.

From Table 4 in the appendix it can be seen that on the brown earth soil type at Mt. Horne one clone, G.S. 29, yielded over 6,500 lbs. of dry cocoa per acre. Four clones (G.S. 36, 18, 57 and 78) produced above 4,500 lbs. dry cocoa while another four clones gave between 4,000 and 4,500 lbs. dry cocoa per acre. A harvest ranging between 4,000 and 3,000 lbs. was recorded for nine clones while thirty four clones produced between 3,000 and 2,000 lbs. of dry cocoa. Yield ranging between 2,000 and 1,000 lbs were harvested from fifteen clones in the trial. In fact only thirteen of the eighty-one representative clones produced less than 1,000 lbs dry cocoa per acre on the brown earth which is indeed the most fertile cocoa soils of the island.

At Ashenden on the red earth soils which have a tendency to fix phosphates and are soils of moderate fertility, two clones, G.S. 29 and G.S. 36, yielded over 4,000 lbs. dry cocoa per acre. Clones G.S. 46 and G.S. 40 produced between 4,000-3,000 lbs. and clones (G.S. 3, 10, 57, 48, 76, 19, 26, 65 and 55) produced between 3,000—2,000 lbs. Thirty-five clones yielded between 2,000—1,000 lbs. dry cocoa per acre. Harvests between 1,000—500 lbs dry cocoa were recorded for twenty-four clones and ten clones produced less than 500 lbs. cocoa per acre.

At Maran Cocoa Station the clonal trial is situated on soils of fair exchange capacity but with poor internal drainage. For the crop year under review only two clones, (G.S. 3 and G.S. 18), yielded above 2,000 lbs. dry cocoa per acre while nine clones, (G.S. 36, 46, 66, 26, 75, 53, 29, 78 and 69) produced between 2,000 and 1,500 lbs. A yield between 1,000 and 900 lbs. was recorded for nine clones while thirteen clones produced between 900 and 800 lbs. dry cocoa. Of the remainder, six clones yielded between 800 and 700 lbs., seven clones betewen 700 and 500 lbs. and five clones below 500 lbs. dry cocoa per acre.

The overall average yield for individual clones was computed and is presented in Appendix II. From Appendix II it can be seen that three clones (G.S. 29, 36, and 46) yielded an average for the three major soil types of the island, of more than 3,000 lbs dry cocoa per acre, while 14 clones (G.S. 3, 57, 78, 26, 2, 18, 50, 17, 77, 48, 11, 55, 79 and 65) produced an average yield ranging between 3,000 and 2,000 lbs dry cocoa per acre. For the remainder of the clones in the trials average production ranging between 2,000 and 1,500 lbs dry cocoa was recorded for twenty-eight clones while that of twenty-three was between 1,500 and 1,000 lbs. dry cocoa. Only nine clones gave between 1,000 and 600 lbs dry cocoa per acre.

Clonal Trials on Estates.—There are five clonal trials established on estates in the island. Of that number two are at Carriere Estate and one each at Grand Bras, Hope and LaTaste estates respectively.

At Carriere Estate the trials No. 1 and No. 2 were planted in 1953 and 1954 respectively while the Grand Bras and LaTaste experiments were laid down in 1953. At Hope Estate the trial was established in 1954.

Fertilizer Treatments.—The estate clonal trials received two pounds of the mixed fertilizer (N.P.K/12.8.24) per tree which was given in two equal applications in June and December.

Cultural Operations.—These consisted of weeding, pruning, de-suckering, staking and cleaning of drains.

Pest and Disease.—Cocoa beetle damage was very serious at both the clonal trials on Carriere Estate. This pest, however, was controlled by regular applications of Dieldrin to the foilage of the trees. Minor outbreaks of thrips were recorded in the estate clonal trials but control measures similar to those employed for the clonal trials on the stations were adopted.

Crop Yields.—Crop yields in the estate clonal trial have continued to increase, however, analysis of the 1958/59 crop yield data has not yet been undertaken.

Hybrid Seedling Trials.—Two simple randomised block hybrid seedling trials were laid down on estates this year. The first trial which was laid down on alluvial soils consisted of four replications each at Boulogne and Dunfermline Estates. The purpose of this experiment is to test the yield on hybrid obtained by crossing top yielding G.S, and ICS clones with the witches broom resistant Amazonian SCA strains.

The treatments in the trial consists of hybrid seedling of the following crosses :—

(i)	ICS	1 x	SCA	12
(ii)	,,	1 x	,,	6
(iii)	,,	6 x	,,	12
(iv)	,,	6 x	,,	6
(v)	GS	29 x	,,	12
(vi)	,,	29 x	,,	6
(vii)	,,	36 x	,,	12
(viii)	,,	36 x	,,	6

The two replications of the trial were planted at Boulogne estate on the 27th of October while those at Dunfermline estate were planted on the 30th of the same month.

The second experiment, a hybrid seedlings vs. clones trial was planted on the 19th and 20th of October at Boulogne estate. The object of this experiment is to compare the yields and resistance to pest and diseases of hybrid seedling obtained by GS x SCA crosses with that of the parent GS clones. The treatments in this trial are as follows :—

(i)	GS	29 x	SCA	6
(ii)	,,	29 x	,,	12
(iii)	,,	36 x	,,	6
(iv)	,,	36 x	,,	12

Hybrid Seedlings Observation Plots.—A series of Hybrid Seedlings Observation Plots were established on Dunfermline, Paradise, Mt. Rose and Grand Bras Estates. The table below shows dates of planting and crosses established on the various estates.

Estates	Date Planted	Crosses
Dunfermline ..	27.11.59	G.S. 36 x SCA 12, ICS 1 x SCA 6, ICS 1 x SCA 12 open
Paradise ..	22 & 23.10.59	GS 36 x SCA 6
Mt. Rose ..	15.10.59	ICS 6 x SCA 12 & ICS 1 x SCA 12
Grand Bras ..	20.10.59	GS 29 x SCA 6.

Manurial and Cultural Trials.—There are two N.P. and K Manurial trials, one each situated at Mt. Horne on the brown earth and at Maran on the shoal soils. The Maran trial was established in 1949, while that at Mt. Horne was planted in 1950.

Design.—These are 3 x 2^2 partially confounded randomised block experiments.

Clones.—The clones employed in the trials are GS 32, 76 and 33 of which GS 76 is a moderate yielder while GS 32 and 33 are ranking among the very poor yielding clones in the clonal trials.

Fertilizer Treatments.—The 9th and 10th manurial treatments for the Mt. Horne and Maran trials respectively were applied during the year in two equal dressings. The table below gives the dates of applications and the quantity of single fertilizers applied to individual trees of corresponding treatments in the plots in the trials.

Table showing the dates of application and the rate (in ounces) of fertiliser applied per tree per application.

	Date of Application		Fertiliser applied per tree per Application							
				Sulphate of Ammonia		Triple Super Phosphate		Sulphate of Potash	
Trial	1st	2nd	No. ozs.	N1 ozs.	N2 ozs.	P0 ozs.	P1 ozs.	K0 ozs.	K1 ozs.
Mt. Horne	30.6.59	16.12.59	—	$13\frac{1}{3}$	$26\frac{2}{3}$	—	10	—	$13\frac{1}{3}$
Maran	24.6.59	23.12.59	—	$13\frac{1}{3}$	$26\frac{2}{3}$	—	10	—	$13\frac{1}{3}$

Cultural Operations.—The cultural operations for the year consisted of cleaning contour drains, staking trees, weeding, de-suckering and pruning whenever these practices were thought necessary.

Pest and Disease.—Thrips and beetle attacks were prevalent during the drier months of the year. Control measures similar to that employed in the clonal trials were adopted.

The incidence of Phytophthora on foilage and pods was particularly high during the months of September and October. Low volume spray applications of fungicide, Perenox with Agral, were regularly applied to the foliage in an effort to control the disease.

Experimental Results.—Analysis of the 1958/59 crop yields had not been conducted at the time of writing.

Pen Manure vs N.P. and K. Equivalent with Extra N.—There are two of these trials, one each at Mt. Horne Cocoa Station and Ashenden Cocoa Station. They were established in 1950.

Design.—They are of a 2^3 partially confounded randomised block design.

Clones.—The clones which were used in the trials are GS 76, 56 and 32 (NB.GS 56 is a poor yielder).

Treatment Application.—Both trials received their sixth treatment applications which were 32 tons of pen manure with its N.P. & K equivalent and extra Nitrogen last year. (The seventh treatment applications will be given in 1962).

Cultural Operations.—The cultural operations as for the other trials consisted of weeding, de-suckering, pruning, staking, cleaning of contour drains and opening of root trains.

Pest and Disease.—As reported for the other trials the incidence of thrips was high throughout the year. In one section of this trial defoliation due to servere thrips' attack was noticed during the earlier months of the year. Similar measures of control to that employed in other trials were adopted. Minor attacks of beetles were also noticed.

In the Mt. Horne trial the incidence of Phytophthora was low expcept for a low-lying section of the trial which tends to be water logged during the rainy season. At Ashenden, however, Phytophthora damage on foilage and pods was severe. Regular spraying with Perenox was made to control the disease.

Yield Analysis.—Analysis of the 1958/59 crop yields has not yet been attempted at the time of writing.

Forking and Mulching and Forking-in-Mulch Trials.—There are two of these trials. One was laid down at Mt. Horne in 1950 and the other at Carriere Estate in 1953.

Design.—These trials are 4×2^2 randomised block experiments.

Clones.—Four GS clones are used in each trial, GS 56, 73, 32 and 5 being employed at Mt. Horne and GS 11, 29, 36 and 32 at Carriere Estate.

Treatments.—The treatments received by the "M" and "MF" plots in both trials were 2,000 lbs of green elephant grass per plot and were given in two equal applications during the year. The first and second mulch applications were made in January and August at Mt. Horne Cocoa Station and February and August at Carriere Estate. After the achievement of partial breakdown of the mulch the "MF" plots were forked together with the "F" plots, the forking operation being conducted in September at both the trials.

Cultural Operations.—The routine cultural operations consisted of weeding, staking, de-suckering pruning, cleaning of contour drains and the opening of root drains at the periphery of the trials.

Pest and Disease.—At Mt. Horne and at Carriere the clones in the trials were sprayed regularly with Dieldrin for the control of thrips and mealy bugs. No signs of cocoa beetle attack were recorded in either of the trials.

The incidence of Phytophthora on the foilage was fairly high in the Mt. Horne trial but was absent in the Carriere experiment. Control measures consisted of frequent applications of Perenox sprays to the foilage.

Yields Analysis.—The results of the 1958/59 crop analysis for the Mt. Horne trial indicate slight but insignificant beneficial effects of mulching of the clones GS 5, 32 and 56, and for GS 73 a significant response (at $t = 0.05$) to mulching was indicated. The effects of forking indicated a slight (insignificant) tendency to suppress yield.

Analysis of the crop yield data for the Carriere Estate trial has not been completed.

Liming and Manurial Trial.—This trial is of a 2^4 factorial design and was laid down at Hope Estate in 1954.

Fertilizer Treatment.—The second dressing of burnt lime was applied to the appropriate plots at the rate of 10 lbs. per tree in July and was then pricked-forked into the soil. Prick-forking was also conducted in all the other plots including the controls.

The lime application was followed by the fertilizer application in December at the following rate per tree :

(*a*) Sulphate of Ammonia 2 lbs.
(*b*) Triple Super Phosphate 1 lb.
(*c*) Sulphate of Potash 1 lb.

Cultural Operations.—These consisted mainly of weeding, staking, de-suckering and pruning.

Disease and Pest.—Minor attacks of thrips were recorded and was controlled in a similar manner as for the other trials.

Results.—Analysis of yields has not been completed.

PLANT PROPAGATION

Propagation statistics for the year under review is given in appendix III.

Propagation on Stations

Rooting of Cuttings.—There was a 49 per cent increase in the number of cuttings set this year over that set in 1958 on the Cocoa Stations. A total of 922,041 cocoa cuttings were set for the year 1959 of which 488,827 were successfully rooted. There was, however, a drop in the rooting efficiency which was 53 per cent in the propagators as compared with 58 per cent for 1958.

The table below gives the comparative figures for cuttings set and rooted in 1958 and 1959 :

Table showing the total number of cuttings set and rooted for the year 1958 and 1959:—

Station	Cuttings set No.	Cuttings Rooted & Stored No.	Rooted Per cents
Boulogne ..	509,641	276,444	54
Ashenden ..	276,444	117,183	50
Maran ..	179,905	95,200	53
1959 Total ..	922,041	488,827	53
1958 Total ..	617,059	357,819	58

Rooted Cuttings Produced.—Of the number of cocoa cuttings rooted 415,175 were successfully hardened off and produced. This total exceeded that of 1958 by 164,891. (See Table below). The propagation efficiency at fifty-four per cent was, however, four per cent lower than that of 1958. This reduction in the propagation efficiency can be attributed to the large increase in the number of cuttings set and produced in the same bin space as for 1958 and the unfavourable weather conditions experienced during the year.

Table Showing the Number of Plants Produced and the Propagation Efficiency in the Boulogne, Ashenden and Maran Propagators for the years 1959 and 1958

Station	Plants Produced No.	Propagation Efficiency* Per cent
Boulogne ..	233,705	46
Ashenden ..	108,853	47
Marsh ..	72,617	40
1959 Total ..	415,175	46
1958 Total ..	350,284	50

*Propagation efficiency : percent: $\frac{\textit{No. of plants produced}}{\text{No. of cuttings set.}} \times 100$

Failure in Storage.—The total number of plants that failed to reach the distribution stage is presented in the Table below.

Table Showing the Number of Plants that Failed in Storage during the year 1959 on the Boulogne, Ashenden and Maran Propagation Stations and the Total Failure in 1958

Station	Plants in Storage No.*	Failure No.	Failure Per cent	
Boulogne ..	349,289	28,191	8	*Figure represent No. of plants produced in 1959 plus that carried over from 1958.
Ashenden ..	143,621	8,175	7	
Maran ..	128,366	22,183	17	
1959 Total ..	621,276	58,549	10	
1958 Total ..	447,279	50,273	13	

From the Table above it can be seen that except at Maran Station which had a high percentage failure (17) on the storage floor the death rate of plants in storage on the whole was relatively low and is in fact three per cent below that of 1958.

Propagation on Estates.—The operation of estate propagators under the assisted subsidy scheme was continued. Ten estates viz : Carriere, Gouyave, Brothers, Dougaldston, La Sagesse, Waltham, Annandale, Mt. Nesbit, Bonaire and Tufton Hall have participated in this scheme and have almost doubled their 1958 plant production this year.

Of the 114,018 cuttings set in the propagation bins this year 75,809 rooted giving a rooting efficiency of sixty-six per cent which is twelve per cent higher than that acheved by the cocoa stations. Of the number of cuttings rooted 63,879 were successfully hardened off and produced thus giving a propagation efficiency of fifty-six per cent and thereby being ten per cent more efficient than the cocoa stations.

Failures on the storage floor, however, were slightly higher than that at the propagation stations and were twelve per cent of the total number of plants stored for the year.

Production of Budded Plants.—There was a positive increase in the number of budded cocoa plants produced this year over the 1958 production. A total of 43,188 seedlings stocks were budded of which 33,684 were successfully taken giving an efficiency of seventy-eight per cent which is three per cent higher than that in 1958. This increase in efficiency can be attributed to the change in technique which consisted of sowing cocoa seeds in plastic pots and when they have germinated and the seedlings have grown to the required size they were budded. This method precluded the practice of lifting which causes damage to the root system of the stock plant when planted on beds. The table below shows the number of stocks budded and the "takes" for the 1958 and 1959.

Year	Stocks Budded No.	Buds Taken No.	Per cent
1959 ..	43,188	33,684	78
1958 ..	23,329	17,547	75

PLANT DISTRIBUTION

The table below gives the total number of cocoa plants distributed during the planting season of the year under review.

Table Showing the Total Number of Plants Distributed for the years 1959 and 1958

Distribution	Type of Plants	No. of Plants Year 1959	Total	Year 1958	Total
Boulogne ..	Clonal Cutting	216,355		140,696	
Ashenden ..	,,	87,303		66,679	
Maran ..	,,	75,001		44,116	
Estates ..	,,	52,998	431,657	16,384	267,275
Boulogne ..	Budded Seedlings	17,478			
Mirabeau ..	,,	4,096	21,574	18,051	18,051
Boulogne ..	Hybrid Seedlings	10,002	10,002	—	—
	Grand Total ..	463,233	463,233	285,926	285,926

A grand total of 463,233 plants, an excess of 177,307 plants over the 1958 total distribution were distributed for this year. Of the total number of plants distributed 431,657 were clonal cuttings, 21,574 were budded seedlings and 10,002 were hybrid seedlings, the seed material of which was imported from Trinidad through the Cocoa Board.

It is estimated that twenty-five per cent of the plants distributed was for supplies to areas already planted and for the establishment of new nurseries. An area therefore, of approximately 1,000 acres of new lands were planted in cocoa this year bringing the estimated acreage under clonal cocoa to 3,315 acres.

It must be mentioned, however, that due to late arrival of the rains plant distribution was a bit retarded especially in the middle belts and low-lying areas. Further, it is estimated that about twenty-five to thirty-five per cent of the plants distributed this year have withered due to the unfavourable weather conditions that prevailed during the " freak" wet season.

APPLICATIONS FOR COCOA PLANTS

The demand for cocoa plants by estate and peasant farmers for the 1960 planting has significantly increased. The total number of applicants was 2,284 and the number of plants applied for was 2,085,116 thus exceeding the 1958 figure of 1,684,059 by 401,057.

From this increasing demand for clonal cocoa plants, it is quite evident that farmers are becoming more and more aware of the great benefit derived from the establishment of their cocoa fields with selected clonal planting material.

Hybrid Seedling Garden.—A hybrid seedling garden designed to produce hybrid seedlings of the following crosses :—

ICS 6 x SCA 6
,, 6 x ,, 12

was established at Mirabeau High Level Station on 18th September, 1959.

Introduction of Clonal and other Materials.—Seeds for the production of Hybrid Seedlings were imported from the Trinidad Cocoa Board.

Cocoa Rehabilitation Board.—Pressure of work did not allow the Cocoa Agronomist the time needed to prepare for and call a meeting of the Cocoa Rehabilitation Board. When the meeting was due the Agronomist was acting Superintendent of Agriculture as well as being responsible for the duties of his substantive post.

HURRICANE RECOVERY NURSERY SCHEME AT MIRABEAU

The propagation programme for a variety of plants other than cocoa more or less reached its peak during the year under review. A total of 358,000 plants of many varieties was produced which exceeded the 1958 production by about 35,000 plants. This increase in plant production was mainly due to the propagation of a variety of crops (e.g. pimento, cloves, sapodillas, etc.), which were not propagated before. In fact there were slight decreases in the production of coconuts, coffee and citrus plants which formed the bulk of the number of plants produced in 1958.

Transplants.—During the year under review 2,183, 35,171, and 59,814 of lemon-, sweet- and sour-orange stocks respectively were transplanted. Other stocks transplanted were 13,915 avocado seedlings and 21,709 mango seedlings.

A total of 148,990 coffee seedlings and 4,423 clove seedlings which were germinated in beds were transplanted into plastic pots.

Budding of Stock.—The following table shows the number of stocks budded and the "takes" obtainedd uring the year.

Type of Plants	Stock Buds No.	Successful Buds No.	1959 Per cent	1958 Per cent
Citrus	115,725	62,635	54	86
Mango	37,714	19,054	50	87
Pears	8,360	167	2	88

The figures in the table above show a big decrease in the efficiency of budding.

Plant Distribution.—The table below gives the number of plants distributed during the year under review and that in 1958.

Table Showing the Number of Plants Distributed from High Level Station during the year 1959

Crop	Variety	No. Distributed	Total 1959	1958
Citrus ..	Limes	41,574		
	Oranges	12,214		
	Grapefruits	4,009		
	Other varieties	2,140	59,937	69,335
Mango ..	St. Julien	4,121		
	Ceylon	4,736		
	Peach	978		
	Graham	2,317		
	Bombay	1,301		
	Other varieties	330	12,783	1,309
Avocado	Budded		141	966
Coconuts	Tall	38,666		
	Dwarf	2,713	41,379	57,237
Misc. ..	Cloves	1,936		
	Sapodillas	6,647		
	Pimento	4,937		
	Sugar apple	5,168		
	Other varieties	1,707	20,395	573
Coffee ..		112,976	112,976	180,000
	Grand Total		247,611	309,420

NUTMEG PROPAGATION

Investigations on various methods of vegetative propagation of nutmegs were continued during the year under review.

Rooting of Stem Cuttings.—Look-see trials on the rooting of nutmeg cuttings were conducted throughout the year.

Sub-Terminal vs. Terminal Cuttings.—In a trial laid down to determine whether cutting material taken approximately 12 inches from the tip of branches i.e., Terminals, or that taken from approximately18 inches from tip of the branch but with the tip removed will root. The results indicate that the terminals root much easier than sub-terminals.

Rooting Stimulants.—In the trials conducted three types of rooting stimulants were employed viz., Seradix L15, Seradix L30 and 0.5 per cent Inodlyl Butyric Acid Solution. The results of the trials indicate that Seradix L15 and the Inodlyl Butyric Acid Solution were more effective in inducing rooting than Seradix L30. Seradix L15, however, gave a better result than Indolyl Butyric Acid Solution.

Type of Medium.—Cuttings were set in bins in the following types of medium :—

(*a*) Saw Dust (coarse) from Grand Etang

(*b*) Fibre Dust

(*c*) Saw Dust (fine) and sand, a 50/50 mixture.

Of the three types of medium, fibre dust was superior and rootings of cutting in that medium commenced in approximately eight weeks time. The coarse type of saw dust from Grand Etang was second best and gave very quick rooting if the medium was not deeper than 6" to 8". Very poor results were obtained from the saw dust/sand medium which tend to water-log very easily.

A total of 1,004 stem cuttings were set during the year of which 182 rooted and were potted into potting soil and placed into successfully hardened off and produced 91. Of the number of cuttings produced 12 failures were recorded in storage. Eleven rooted cuttings were planted in a nursery at the Mirabeau High Level Station.

Marcotting or Aerial Layering.—A total of 18,839 twigs were marcotted for the year and 6,604 rooted marcots were severed from the parent twig, potted, if not discarded, and placed in bins to be hardened off. Of the number of marcots removed 2,067 were discarded and 1,963 failed during the hardening period which extended over twelve weeks. A total of 4,297 marcots were successfully hardened off and produced.

Of the total number of marcots stored under saran net shade for the year 910 withered while in storage.

A total of 3,060 marcots were distributed during the planting season.

Approach Grafting.—The number of stock plants which were grafted on to twigs of female trees was 4,013 for the year under review. Of the grafts performed 2,014 united and were severed from the parent tree and placed into bins to be hardened off. During the hardening process 384 failed, 704 were produced while 926 were still undergoing the hardening process.

Failure in storage during the year was 229 and 383 grafted plants were distributed for planting out into the fields.

Stock Plants.—A total of 26,897 seedlings to be used as stock plants were collected form the nutmeg fields during the year and were potted and stored at Boulogne Propagation Station. The seedlings that failed in storage totalled 1,152.

Field Performance.—The marcotted nutmeg plants planted in August, 1957, at Mirabeau High Level Station have continued to progress favourably under the ideal conditions provided at the station. Quite a few pods were produced during the year. The nutmeg demonstration plots planted on estates were making fair progress where proper attention was being paid to the plants. It was also evident that adequate shade must be established before planting the marcots in the field as they tend to wither when exposed to direct sunlight.

Nursery.—A nutmeg nursery was established at Mirabeau High Level Station as it is felt that under controlled nursery conditions better results can be obtained from the techniques now employed than under adverse and uncontrolled conditions in the field.

Introduction of Malayan Seedlings.—A total of 808 nutmeg seeds were imported from the Malayan Department of Agriculture and were sown in propagating bins at Boulogne Station. Of the number of seeds sown, 149 germinated and were potted. These seedlings will be planted in an isolated nursery and their progress under Grenada conditions will be kept under observation.

BANANAS

Distribution of Suckers.—The distribution of free banana suckers to farmers continued and approximately 90,000 suckers were released to needy farmers, the plants for distribution being purchased from producers with excess planting material. A few of the suckers released were secured from Government Nurseries or from farmers under the "Sucker for Sucker" Scheme introduced shortly after hurricane 'Janet'.

Demonstration and Experiments.—Six banana demonstration plots which had been established during 1958 were abandoned late in 1959, after it was considered that they had served their purpose. Three fertiliser experiments were laid down during the year.

Artificial Irrigation.—Three estates imported equipment for sub-canopy artificial irrigation of bananas, primarily on alluvial fields. The ventures were all successful as the droughty weather adversely affected production in all non-irrigated areas.

Extension.—The Banana Officer left the island late in the year on long leave prior to the abolition of the post in March, 1960. The post is paid from Agricultural Rehabilitation Funds. However, the regular district extension staff maintained their special efforts geared to keep producers ever improving methods of growing bananas and handling fruit destined for export.

Distribution by Parish.—As a result of a study of the origin of stems delivered at the reception depot, St. George's, the Grenada Banana Co-operative Society was able to estimate the production of bananas in the various parishes. The data is reproduced in the table below :

Production of Bananas by Parish, 1959

Parish	No. of Stems	Percentage of Total Production
St. Andrew	400,261	35
St. John	238,216	20
St. Patrick	201,439	18
St. Mark	176,265	15
St. George	86,546	8
St. David	48,816	4

Banana Insurance.—In July the Grenada Banana Co-operative Society along with the other members of the Windward Islands Banana Growers' Association initiated a Statutory Insurance Scheme to cover losses resulting from windstorms. This is compulsory and covers ratoon matts only. Individual farms may still enter into private contractual arrangements at higher rates to cover plant fields. Numerous successful claims were filed following the highwinds in July and October. No doubt this Statutory Insurance Scheme will further stabilise the industry and bolster its status as a major export crop.

PLANT PROTECTION

During the year Officers were called upon to advise farmers on control measures for numerous pests and diseases many of which had formerly gone unnoticed.

It is now evident that most farmers have realised that Plant Protection is complementary to Plant Production and they are quite prepared to make full use of the services offered by this Division.

Banana

Banana Leaf Spot (*M. musicola*).—Through a scheme financed originally by a Rehabilitation grant and supplemented by funds accumulated from Banana Cess, the very extensive leaf spot control programme was continued, and this year a total of 118,385 acres were sprayed using 69,215 gallons of Orchard Oil and 41.5 cet. Copper Oxychloride.

The oil consumption appears low, but this is explained by the fact that over eighty-three per cent of banana cultivation is interplanted with cocoa and other crops thus giving a fairly low population of banana matts per acre.

As a whole, leaf spot control was excellent this year—a fact this is attributed to the combined effect of low rainfall and the increased efficiency of *spray application* and *timing*.

Panama Disease (*F. oxysporum*).—This disease is still prevalent wherever Gros Michel is grown and farmers are continually encouraged to replace this by Lacatan—a variety which is resistant to the disease.

Blackhead Toppling Disease (*R. similis*).—This is a nematode infection which causes severe damage to the root system, with the result that the plant topples very easily. As damage to the root system develops, the leaves become markedly yellow and later wilt, so that the plant either fails to produce fruit or the fruit produced fails to mature properly.

Symptoms were first observed at Annandale Estate but the disease is now much more widely distributed.

Due acknowledgment is here recorded for the help given by Dr. Fenwick and Dr. Hagley of the Red Ring Research Division of the Department of Agriculture, Trinidad, for their kind help in the identification of the nematode.

Nemagon appears to be fairly effective against this pest and in November, an observation trial was laid down at Annandale Estate using three levels of this chemical. The application was based on the 'Guinea' method of injecting the fumigant into the soil at distances of one to two feet from the plant.

The trial is still under observation as the fumigant is slow-acting and visual symptoms are not expected before March/April, 1960.

Cocoa

Witches' Broom Disease (*M. perniciosus*).—The extent of work done to control this disease is superceded only by the very elaborate Banana Leafspot Control Programme. Virtually throughout the year with peak periods in May/June and September/October, workmen from this division inspected the cocoa growing areas. Some 36,500 acres were traversed and 20,700 trees pruned.

The incidence was slightly lower than last year but followed the same general pattern, incidence was highest in the higher rainfall areas.

Cocoa Thrips (*S. rubrocinctus*).—The harmful effect of this pest were quite noticeable during the dry season and approximately 2,900 acres were treated with dieldrin to effect control.

Cocoa Beetle (*S. breve*).—Orchard Oil used for the control of banana leafspot continues to give good control of this pest in inter-planted fields, and its occurrence was frequent only in fields where banana trees were very few.

Other Crops

Sugarcane Froghopper (*A. varia*).—This pest gave little cause for alarm this year as the few fields which showed high nymphal populations were treated early. A total of 168 acres were treated either with Dieldrin or B.H.C. Dust.

Sugarcane Moth Borers (*Diatraea spp.*).—As a continuation of last year's programme a factory count was again made this year. This showed an average joint infection of 13.6 per cent, with a range of 9.6—19.9. The average is 3.0 per cent higher than last year.

Red Ring Disease (*A. cocophilus*). *and Bud Rot* (*P. palmivora*).—Both account for fair losses in coconut fields, and except for sanitary measures, very little can be done to control either of these diseases at present.

General

Equipment and Vehicles.—The eight (8) Land Rovers controlled by the Division worked throughout the year except for short periods while undergoing major overhaul.

The following mist-blowers were operated by the Division :

Kiekens Dekker	49
Motoblo	19
J.L.O.	21
Carl Platz	16
Micronette	4
Trojan	1
	110

The performance of the various machines is being studied and there will be a gradual switch over to the most efficient and economic motor to take advantage of the obvious benefits of standardisation.

LAND USE

The Land Use Division which only came into being in 1957 passed a very difficult year in 1959 for in January the Land Use Officer was transferred to the post of Agricultural Officer (General) and no replacement was made. Left on his own the Land Use Assistant undertook a very restricted programme —work was largely limited to land capability mapping and farm planning for small farmers.

The Land Use Assistant visited numerous small farms in conjunction with members of the extension staff and in addition to preparing soil maps and farm development plans he gave advice on the most efficient use of the various soil types. Small farmers were visited in the following areas :

Laura	Mt. Plaisir
Marlmont	River Sallee
Morne Delice	Tivoli
Vincennes	Pointzfield
Calivigny	Waterloo
Grenville Vale	Mt. William
Mt. Granby	

Estates or large holdings mapped during the year included :

Hampstead	Mt. Airy
Upper Richmond	Mian
Lower Richmond	Sea Breeze
Windsor	

Work on the preparation of special maps was continued and two maps were completed, one showing the distribution of major crops, and the other recording the location of estates.

During March, Mr. Charles Wright, Senior Soil Survey Officer, New Zealand, while on vacation conducted a one week survey of the soils of the Grand Etang and Mt. Catherine areas. A number of soil samples were taken for analysis and an unofficial report was submitted.

Soil Conservation.—The staff of the extension service continued to assist all farmers with the laying down of soil conservation measures on holdings and estates. In instances where Land Capability Maps had been prepared by the Land Use Division for properties, soil conservation were laid down in accordance with farm plans based on the capabilities of the land on those properties.

The following table shows the number of feet of vegetative barriers planted, contour drains dug and stone barriers laid down in the various extension districts during the year :

	Vegetative Barriers	Contour Drains	Stone Barriers
North Grenada ..	128,700 (feet)	229,535 (feet)	7,421 (feet)
South Grenada ..	84,873	42,835	200
East Grenada ..	352,878	236,739	640
West Grenada ..	63,790	38,950	2,290
Carriacou	16,852	679	19,907
	647,093	548,738	30,458

Other work consisted of locating head drains and run-off drains, the grassing down of run-off drains and gully control work.

VETERINARY

Condition	No. of Cases Treated	Recovered	Died
Actinomycosis	11	9	2
Chokes (during Mango season) ..	6	6	—
Dystocia (difficult birth) ..	7	7	—
Gut Edema	31	28	3
Ketosis	45	39	6
Mastitis	50	50	—
Peritonitis	1	—	1
Piroplasmosis, Anaplasmosis ..	19	17	2
Prolapsed Uterus	21	20	1
Retained Placenta	24	24	—
Tetanus	6	2	4

In addition, ninety-six (96) successful castrations were performed.

Import, export and quarantine.—There were outbreaks of Newcastle disease in the neighbouring islands of Trinidad, Barbados and St. Vincent and a ban was placed on poultry importations from these territories.

No outbreaks of Foot and Mouth occurred in the federated territories and strict quarantine is still enforced against England, the Low Countries and South America. Permits for meat and meat products not in hermetically sealed containers were issued only for products from countries free from foot and mouth disease, viz., Canada, United States of America, Australia and New Zealand.

Permits were issued for the importation from the U.S. A. and Canada of about 3,000 baby chicks per month. As usual, during the year quantities of poultry and some horses, mules and donkeys were shipped to Trinidad. Most of the horses returned after racing there.

LIVESTOCK

Artificial Insemination

A total of 366 cows were inseminated during the year under review. Of this, 279 were first services and 87 were repeat inseminations. Repeat inseminations also include a few cows and heifers which were naturally served previously but did not result in pregnancy.

Area Distribution of Services

Parish	No. of Inseminations
St. George ..	97
St. David ..	91
St. Andrew ..	56
St. Patrick ..	58
St. Mark ..	54
St. John ..	10
Total ..	366

The above figures indicate that the greater response obtained from livestock rearers in Grenada South continues as in previous years. However, there has been an increase in the percentage of the total number of services in the northern parishes.

The Red Poll bull 'Kirton's Masterpiece' was imported from the U.K. and arrived in Grenada in January 1959,for use in the Artificial Insemination Scheme. In addition to this Red Poll, three Jersey bulls and one Nelthrop bull were used for the purpose of collecting semen. On the stock farm of one of the largest livestock rearers in the island, nineteen first inseminations were carried out using imported frozen semen of Jersey and Holstein breeds from Canada.

LAND SETTLEMENT

Forestry

Matters relating to land settlement and forestry ceased to be the responsibility of the Department of Agriculture as from the 1st June, 1959, when the newly established Government Department of Forestry and Lands came into being.

Fisheries

During the year 1959 the Government fishing boat "Daislyn" underwent major repairs and a new 27 h.p. marine engine was installed.

A survey was carried out by members of the Fishery Division of the S.S.E. coast, as a result of which fishing banks little used by local fishermen were proved to be excellent fishing grounds. Following on this survey, fishermen were escorted by the Government fishing boat to the area where very good catches were made.

A total of $10,878 was given as loans to fishermen to purchase marine engines for their fishing boats.

SECTION IV

CARRIACOU

Weather.—Rainfall was very low and irregular and the drought almost completely destroyed foodcrops which depend on the seasonal rains. All attempts failed to establish foodcrops prior to the rains in October. The cotton crop and established lime trees did not suffer unduly from the low rainfall. Below in table form are annual returns for the three recording stations for 1958 and 1959 compared with average annual rainfall.

Station	1958	1959	5 Years average
Dumfries	34.44	34.97	43.38
Limlair	37.15	32.93	45.18
Belair Park ..	46.13	40.87	50.07

It can be seen from the above figures that both 1958 and 1959 were very dry years. Whereas Dumfries rainfall was constant for 1958 and 1959, the central and northern areas were significantly drier in 1959. At Belair Park the 1959 total was 20 per cent below normal whereas Limlair only received 72 per cent of average annual precipitation.

High winds were unusually strong from February through May—and stripped the seed cotton from the bolls. Lime blossoms were also damaged.

AGRICULTURAL PRODUCTION

Crops

Cotton.—The cotton plants (Gossypium hirsutum Var. Marie Galante) were heavily attacked by leaf eating insects. The damage occurred before the bolls appeared and production was little affected. However, total yield was 852 cwts. of lint compared with 1,075 cwts. in 1958. Production of cotton lint and cotton seed are given below :

Year	Cotton Lint (Cwts.)	Cotton Seed (Tons)
1953	1,771	237.0
1954	1,182	183.7
1955	1,093	174.5
1956	780	116.6
1957	967	150.6
1958	1,075	168.9
1959	852	134.3

The price paid at the ginnery for seed cotton was 12c. per pound, i.e., the same as paid during 1958.

Limes.—A bumper lime crop was reaped. Dumfries as usual manufactured lime oil, but Craigston Estate switched over to lime juice and sold 23,182 gallons in Trinidad. Lime juice fetched 75c. per gallon in Trinidad and lime oil approximately $11.64 per lb. on the U.K. market. The quantity and value of lime oil exported from Carriacou are given below for the period 1954—1959 :

	1954	1955	1956	1957	1958	1959
Lime oil (lbs.)						
Dumfries ..	630	256	—	360	630	1,070
Craigston ..	1,845	720	—	180	450	—
Lime juice (gals.)						
Craigston ..	—	—	—	—	—	23,182
Total $ Value ..	22,275	6,383	—	5,832	12,441	29,798

Coconuts.—No coconuts are available for export, nevertheless this crop is important locally and efforts are being made to increase acreage and production. Recent plantings are thriving despite the drought.

Sorrel.—There has been new interest in sorrel and more was planted than in previous years. The crop was a good one and export of dry petals is being organised.

Foodcrops

Corn—Drought and disease destroyed all corn planted.

Pigeon Peas—The peas crop was very poor.

Yams—Yams yielded moderately.

Sweet Potatoes.—The first crop failed. Second planting in October with slips from St. Vincent promised a fair 1960 spring crop.

Foodcrops production was very inadequate and special relief measures had to be organised to ensure an adequate supply of peas, potato, bluggoe, banana, breadfruit, etc., from Grenada.

Livestock

The drought affected the livestock industry and much of the small stock was consumed in the local market. Despite willingness of farmers to release animals earlier than normal in face of drought, the total number and value of exports continue to decline as shown by the data in the table below :

Year	Cattle	Sheep	Goats	Poultry	Hogs & Donkeys	Total Value
1956	331	291	208	4,268	—	$39,400
1957	210	187	139	7,070	—	29,400
1958	189	167	116	8,785	—	29,200
1959	201	39	30	2,841	4	23,561

As in the past the majority of animals shipped were for sale in Martinique.

WORK IN THE DEPARTMENT

Extension Service

During the year officers made 716 visits to farms. Officers called or assisted at 53 farmers' meetings and one conducted tour was organised. Livestock and pasture management received considerable emphasis. Farmers were urged to limit stock to two heads per acre, grass planting, fencing and rotational grazing were vigorously encouraged.

Plant Distribution.—Distribution of free plants from Mirabeau Nurseries was carried out as usual, however, the vast majority of plants was lost. They either perished due to drought or were destroyed by starving animals in search of pickings.

Plants distributed to farmers were :

Budded Limes ..	5,325
Citrus, other than Limes	515
Coconuts—tall ..	1,500
dwarf ..	1,005
Mangoes ..	1,076
Cloves	125
Pimento	300
Sapodillas	300
Sugar Apple	400
Breadfruit	309
Breadnut	100
Pineapple	200
Miscellaneous	214
Total	11,369

Soil Conservation.—In Carriacou hill slopes frequently show signs of advanced erosion and so officers of the Agricultural Department invariably devote considerable time to promote Soil Conservation practices.

For the first time many indigenious plants have been used in laying down vegetative barriers. Aloes (Aloe vera), Lash (Sansivera) and Physic-nut (Jatropha curcas) stood up well against draught and straying animals.

The table below shows the work on conservation measures :

Type of Protection	Footage
Stone Barriers	19,907
Vegetative Barriers ..	16,852
Drains	679
Gully Protection	100
Total	37,538

Soil Conservation Grants.—Thirty five applications were approved for grants under the SoilConservation Scheme administereed by the Central Agricultural Rehabilitation Committee. In all, $2,189.01 was paid as grants for work done.

Loans.—Five farmers submitted application to C.A.R.C. for Long Term Loans. Two applicants were successful and $15,323.95 were issued.

Tractor Service.—At the beginning of the second quarter of the year a tractor loan service was made available to farmers in Carriacou. Government operates a crawler tractor under a scheme supervised by the Senior Agricultural Assistant. On filing an application, the farmer deposits perhaps one quarter of the estimated money value of the job to be done on his farm. When the work has been completed the farmer pays the remainder of the charge by instalments. To date, the service has been widely used and is regardeded an unqualified success.

LIMLAIR AGRICULTURAL STATION

Crops.—The small plots on the station planted in corn, peas, yams and sweet potatoes yielded miserably due to the drought.

Pastures.—Late in the year when the rainfall situation had improved somewhat, it was possible to extend the area under Pangola grass. This grass appears to have a promising future in Carriacou as its performance has been most satisfactory.

Livestock.—The drought affected the animals on the station and whereas it was possible to maintain the cattle in fair condition, the sheep suffered terribly and five died. To relieve the feed situation five (5) ewes and seven (7) lambs were sold. One of the serving bulls became impotent and was sold. Services by studs on the station are given hereunder :

Bulls	..	65
Boar	..	32
Ram	..	0
Total	..	97

The ninety-seven (97) servings recorded were significantly less than the one hundred and sixty-seven (167) registered for 1958.

The number of laying hens on the station was increased by ten to total eighteen hens.

Egg Statistics :—

Eggs collected during the year		2,559
On hand from last year	..	10
Total	.. ..	2,569
Eggs sold	.. ..	2,563
Carried forward to 1960	..	6
Total	.. ..	2,569

Births and deaths of livestock are given below :—

Births :	Calf	..	1
	Lambs	..	5
Deaths :	Sheep	..	5
	Poultry	..	2

Experiments.—The limited experimental work including *ad hoc* trials normally undertaken at the station was abandoned due to the very droughty weather.

Rainfall Average 1948—1958

No.	Observation Station	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	Total	Average
1.	Botanic Gardens ..	..	65.70	87.30	83.58	64.68	85.31	96.27	96.78	105.47	72.12	72.66	829.87	82.99
2.	Mt. Moritz Agric. Stn.	79.52	64.50	96.80	93.41	65.65	80.90	99.63	79.19	83.79	78.00	88.94	910.33	82.76
3.	Tivoli Agric. Stn.	58.67	70.14	76.14	84.89	58.81	83.52	92.22	98.95	75.23	59.19	69.44	827.20	75.20
4.	Westerhall Agric. Stn.	69.83	57.13	72.45	48.11	51.07	72.97	76.19	73.62	70.76	63.04	61.20	716.37	65.12
5.	Ashenden Cocoa Stn.	103.75	..	128.02	110.99	84.56	121.21	133.77	108.52	105.81	89.40	106.85	1092.88	109.29
6.	Boulogne Cocoa Stn.	76.78	85.45	107.27	106.91	75.01	87.18	87.30	88.67	66.83	65.41	81.03	927.84	84.35
7.	Maran Cocoa Stn.	106.20	90.24	120.52	117.60	74.30	106.86	119.77	96.15	118.25	96.72	103.76	1150.37	104.58
8.	Mt. Horne Cocoa Stn.	..	..	..	..	..	96.65	101.41	97.21	76.14	70.82	85.52	527.75	87.96
9.	Mirabeau Nurseries	..	..	..	..	..	..	..	..	..	..	..	..	..
10.	Grand Etang ..	140.24	135.01	154.68	..	119.32	180.14	183.90	93.60	..	189.27	168.72	1364.88	151.65

SECTION V

Visitors

His Excellency the Acting Governor, Mr. G. Lindo
Honourable H. A. Blaize, Minister for Trade and Production
Arana, M.D., Farm Demonstrator British Honduras—Student at E.C.F.I.
Change, N., Specialist on Tropical Fish
Coulter, J., Head of Soil Department, Regional Research Centre, I.C.T.A.
Curry, D., Director, W.I.A.C.S.
Gibson, D., Department of Agriculture, St. Vincent
Grant, G., Exrta Mural Department, U.C.W.I.
Hess, Dr. Ernest, Federal Fisheries Adviser
Martin-Kaye, P. H., Government Geologist, Windward Islands
Murray, D. B., Senior Plant Physiologist, Regional Research Centre, I.C.T.A.
Nash, E., Department of Agriculture, St. Vincent
Orr, Miss E., Principal Scientific Officer, Tropical Products Institute
Silverstein, J., Photographer, National Geographical Society
Traunge, Ian Olaf, Naval Architect, Fisheries Division, F.A.O.
Twyford, I. T., Agronomist, ,Soil Department, Regional Research Centre, I.C.T.A.
Vernon, K., Soil Surveyor, Regional Research Centre, I.C.T.A.
Wright, C., Senior Soil Surveyor, New Zealand
Zepherin, Miss M., Nutrition Officer, Windward Islands.

SECTION VI

STAFF OF THE DEPARTMENT OF AGRICULTURE

A.—Technical

1. Head Office

G. A. Southwell, D.I.C.T.A.	Superintendent of Agriculture (Ag.)
E. Payne, B.S.A.	Agricultural Officer (Ag.)

2. EXTENSION DISTRICTS

North

G. A. Phillips, Dip. Agric., (O.A.C.)	Agricultural Assistant
R. Arthur	Junior Agricultural Instructor
O Charles,	,, ,, ,,
C. Garrett	,, ,, ,,
L. Grenade	,, ,, ,,
K. Shears	,, ,, ,,
F. Wellington	,, ,, ,,
P. Campbell	,, ,, ,,

South

K. I. Rush, Dip. E.C.F.I.	Agricultural Assistant
C. Alexander	Junior Agricultural Instructor
C. D. Augustine	,, ,, ,,
N. S. Knight	,, ,, ,,
J. Marrast	,, ,, ,,
M. A. Regis	,, ,, ,,
H. Stevenson	,, ,, ,,
M. Charles	,, ,, ,,

East

W. E. Bain	Agricultural Assistant
E. Calliste	Junior Agricultural Instructor
R. Hannibal	,, ,, ,,
M. John, Dip. E.C.F.I.	,, ,, ,,
S. Joseph	,, ,, ,,
C. Mitchell	,, ,, ,,
R. Noel	,, ,, ,,
J. Telesford	,, ,, ,,
B. Pierre	,, ,, ,,

West

E. O. Barrett, Dip. J. S. A.	Agricultural Assistant
O. Campbell	Junior Agricultural Instructor
D. Hosten	,, ,, ,,
S. D. C. Law	,, ,, ,,
M. A. Wilson	,, ,, ,,

Carriacou

A. C. Branch, Dip. E.C.F.I.	Senior Agricultural Assistant
L. M. Christopher, Dip. E.C.F.I.	,, ,, Instructor
R. Clara	Junior ,, ,,
O. David	,, ,, ,,

3. Cocoa Industry Improvement Scheme

D. A. Perryman, D.I.C.T.A.	Cocoa Agronomist
A. M. Cruickshank, D.I.C.T.A.	Agricultural Officer—on study leave.
C. A. Phillips, D.I.C.T.A., A.I.C.T.A.	Ag. Agricultural Officer (Cocoa)
N. D. Nedd, Dip. E.C.F.I.	Agricultural Assistant, Officer-in-Charge, Maran Cocoa Station
B. A. Pitt, Dip. E.C.F.I.	Senior Agricultural Instructor, Officer-in-Charge, Ashenden
R. Mark, Dip. E.C.F.I.	Ag. Senior Agricultural Instructor
D. Fletcher	Field Assistant, Officer-in-Charge, Boulogne Propagation Station
R. L. Benjamin	Field Assistant
J. Marshall	Foreman, Maran Cocoa Station
R. Honore	Foreman, Ashenden Cocoa Station
O. Lycorish	Junior Field Assistant
M. Peters	Junior Field Assistant
P. Francis	Propagation Attendant, Boulogne Station
R. George	Propagation Attendant, Ashenden Station
O. Benjamin	Propagation Attendant, Maran Station

4. Hurricane Recovery Nursery Scheme

I. Ferreira	Senior Assistant, Officer-in-Charge, Mirabeau Station
R. E. Gittens	Works Overseer
O. John	Field Assistant
E. Evans	Mechanic

5. Plant Protection

R. E. Pierre, D.I.C.T.A.	Plant Protection Officer, (Ag.)
L. Raeburn	Senior Plant Disease Inspector
B. Hamilton	,, ,, ,, ,,
B. Calliste	Plant Disease Inspector
C. Campbell	,, ,, ,,
A. Fletcher	,, ,, ,,
S. Kent	,, ,, ,,
A. LaTouche	,, ,, ,,
J. A. Leid	,, ,, ,,
R. Pierre	,, ,, ,,
W. Sawney	,, ,, ,,
F. Haynes	Chief Mechanic

6. Veterinary

E. C. Arthur, B.Sc., D.V.M., V.S.	Veterinary Officer
E. A. Holt, M.R.C.V.S.	Supernumerary Veterinary Officer
A. S. N. Gittens	Veterinary Assistant

7. Livestock

E. John, Dip. Agric. (O.AC.)	Livestock Officer

8. Banana

E. S. Holgate, Dip. J. S. A.	Banana Officer

9. Cane

L. D. G. Cromwell	Cane Farming Officer

10. Food Crops

R. F. Edwards, Dip. E.C.F.I.	Senior Agricultural Instructor

11. Land Use

Vacant	Land Use Officer
C. Francis	Land Use Assistant

12. Fisheries

C. Grubbe	Fishery Officer
N. Greaves	Fisheries Assistant

13. Marketing Division

J. Wilson	Marketing Officer

14. Produce Inspection

D. Mason	Produce Inspector
H. Otway	Produce Inspector

15. Agricultural Stations

. E. Carter	Foreman, Westerhall Agricultural Station
O. Knight	Foreman, Mt. Moritz Agricultural Station
L. Whiteman	Acting Foreman, Tivoli Agricultural Station

B.—Clerical

1. Head Office

C. V. Strachan	Office Superintendent
R. Cox	Class II Clerk
C. Lowe	Class II Clerk
M. Cameron	Class III Clerk
N. Stephenson	Class III Clerk
H. Thomas	Class III Clerk
M. Haywood	Class III Clerk
R. Steele	Class III Clerk

2. Out Offices—Cocoa Industry Improvement Scheme

E. N. Barriteau	Class II Clerk
K. J. Nedd	Class III Clerk
R. J. Edwards	Class III Clerk
B. Grant	Class III Clerk
N. Caesar	Class III Clerk
H. Williams	Class III Clerk
A. Ogilvie	Class III Clerk
A. Rose	Class III Clerk

3. Agricultural Stations

H. John	Clerical Assistant
G. Barrett	Clerical Assistant
M. Briggs	Clerical Assistant
R. Roberts	—

4. Marketing Organisation

B. Steele	Clerk-Storekeeper
A. Cobb	Assistant Storekeeper

MONTHLY AND ANNUAL RAINFALL RETURNS—1959

No.	OBSERVATION STATION	January	February	March	April	May	June	July	August	September	October	November	December	Total	Maximum in one day and date		No. of days on which rain fell
		Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins	Ins.	Ins.	Ins.	Ins.	Ins.	Date.	Ins.	
1	Annandale Station ...	3·37	6·97	4·65	3·30	9·56	4·82	8·11	7·56	13.20	19·98	7.09	8·72	97·15	Oct. 11th	6·11	207
2	Ashenden Cocoa Station ...	2·52	5·20	3·36	2·26	6·03	4·86	7·13	5·11	8.64	14·85	7·95	8·26	76·16	Oct. 11th	4·22	274
3	Baillies Bacolet Estate ...	2·31	2·16	2·55	·48	4·37	3·14	6·65	5·06	7·27	15·14	5·41	4·68	59.22	Oct. 11th	5·50	161
4	Balthazar Estate ...	2·36	4·41	2·77	2·15	5·18	4·52	7·09	6·62	6·80	17·25	5·52	5.58	70·25	Oct. 11th	6·10	138
5	Bardia Estate ...	2·83	3·27	2·28	·85	3·56	·79	6·07	5·28	...	...	...	...	...	...	...	...
6	Belvidere Estate ...	4·97	6·50	5·72	4·92	11·57	8·98	10.58	8·05	11·45	23·43	12.25	11.55	120·47	Oct. 12th	4·80	221
7	Belair Park, Carriacou ...	1·43	·69	2·08	2·14	1·47	3·70	3·53	3.00	4·35	11·63	13·27	3·13	40·42	Oct. 11th	4·50	73
8	Botanic Gardens ...	1·96	2·69	2·34	1·75	4·71	3·78	7·48	7·14	7·81	10.05	5·19	5·66	60·56	Oct. 10th	2·63	152
9	Boulogne Cocoa Station ...	1·88	3·10	2·66	1·30	6·08	4·07	6·43	6.09	5·07	12·70	6·12	4.13	59·63	Oct. 10th } Oct. 16th }	2·07	239
10	Brothers Estate ...	1·05	4·80	3·69	2·92	8·08	6·41	7·21	6·59	11·62	18·57	6·99	7·37	85·32	Oct. 11th	6·88	276
11	Blair Athol Estate ...	2·58	3·16	3·47	2·17	4·47	4·08	6·15	6·36	5·31	13·24	6·64	5·24	62.87	Oct. 12th	4·69	211
12	Calivigny Estate ...	1·60	1·63	1·41	·33	3·14	2·46	4.08	5·37	5·66	11·57	3·85	3·87	35·07	Oct. 11th	3·36	173
13	Calliste Estate ...	·73	·93	·65	·37	2·16	2·61	2·18	3.82	3·30	6·86	2·44	2·64	28·69	Oct. 12th	1·64	154
14	Carriere Estate ...	1·74	2·22	...	.81	5·22	4·29	3·99	6.11	3·44	12·42	5·66	6·11	...	Oct. 11th	...	...
15	Crayfish Estate ...	3·55	3·13	3·40	2·25	4·93	4·61	6.11	6.31	7.52	16·56	8.03	6·65	73·05	Oct. 11th	4·65	247
16	Dougaldston Estate ...	2·68	5·12	4·83	2·75	7·22	7.37	8·99	7.90	10·07	22·56	6·60	8·45	94·54	Oct. 11th	5·89	267
17	Dumfries Estate, Carriacou ...	1·77	2.53	1·91	·85	2·35	4·60	2·60	2·00	·82	7·81	2 71	4·52	34·87	Dec. 10th	3·67	66
18	Dunfermline Estate ...	1·09	1·96	1·51	·40	5·00	3·77	6·31	5·58	4·60	13·25	4·29	4·08	51·84	Oct. 12th	4·50	117
19	Grand Bacolet Estate ...	2·75	3·81	3·63	1·63	6·08	3·84	9·70	9·02	8·50	17·36	7.75	5.66	79·73	Oct. 11th	5·03	268
20	Grand Etang House ...	6·23	10·38	8·14	5·20	13·03	10·37	18·56	11.70	17.01	21·53	10·77	11·33	144·22	Oct. 11th	3·10	345
21	Hope Estate ...	1·40	1·80	1·65	·99	4·06	4·22	4·71	5·22	5·33	12·12	7.49	4·90	53·89	Oct. 11th	5·03	151
22	Hope Vale Estate ...	1·99	2·06	2·37	1·68	3·67	2·68	5·29	4·53	6.46	12·46	4·72	5·25	53·16	Oct. 11th	3·53	199
23	La Sagesse Estate ...	2·11	2·63	1·70	·32	3·33	2·90	5·16	4·64	5·75	12·54	4·88	4·36	50·32	Oct. 11th	7·40	245
24	L'Anse Aux Epines ...	1·20	1·42	·76	·66	2·75	2·74	2·76	4·57	3·97	10·18	4·35	3·09	38·45	Oct. 12th	2·57	170
25	Limlair Agricultural Station, Carriacou...	1·15	1·16	1·51	1·53	1·10	2·77	3·39	2·73	3·74	7·78	3·39	2·38	34·63	Oct. 11th	1·60	79
26	Lower Marli Estate ...	3·15	2·17	2·79	1·44	3·81	3·74	3·18	6.44	6·81	12·24	6·11	3·77	55·65	Oct. 11th	3·48	202
27	Les Avocats Water Works ...	3·38	7·55	3·22	2·23	7·92	5·62	8·54	6·92	11·61	21·92	8·07	4·35	68·33	Oct. 12th	7·40	245
28	Maran Cocoa Station ...	3·67	4·84	3·69	3·11	6·90	6·30	8·49	7·38	8·56	19·63	8·02	6·63	87·22	Oct. 11th	5·65	295
29	Mirabeau Agricultural Station ...	2·15	3·70	2·80	1·90	4·99	4·74	5·06	5·84	4·66	18·24	4·49	4·12	62·69	Oct. 11th	6 80	157
30	Mt. Felix Estate ...	5·59	8·63	5·33	4·09	12·94	9·18	9·72	12·60	8·34	19·84	...	15·74	...	Aug. 16th } Oct. 11th }	...	...
31	Mt. Horne Cocoa Station ...	2·34	3·41	3·15	1·39	5·03	5·90	6·67	6.41	4·63	13·15	6·58	4·61	63·27	Oct. 11th	5·00	183
32	Mt. Moritz Agricultural Station ...	2·33	3·39	3·69	2.69	2·89	4·89	9·21	5·56	8·40	16·70	4·33	4·52	68·59	Oct. 11th	4·75	215
33	Nianganfoix Estate ...	2·87	4·55	1·85	1·75	10·12	4·55	7·40	5·15	10·95	20·55	8·35	7·55	85·64	Oct. 11th	3·55	207
34	Pomme Rose Water Works ...	1·99	3·26	3·42	1·30	4·53	3·68	6.63	5·18	4·64	12·17	4·82	5·09	56·71	Oct. 12th	3.75	179
35	Richmond Estate ...	·97	4·69	1·95	·93	4·85	4·88	8·16	...	4·46	11·57	...	..	..	Oct. 12th	...	...
36	Samaritan Estate ...	2·82	3·52	3·89	2·32	5·44	4·10	6·60	7·98	6·50	14·08	8·06	6·33	71·64	Oct. 11th	3·41	262
37	Tivoli Agricultural Station ...	1·90	1·68	2·27	1·48	3·75	4·01	4·66	3·84	2·54	10·80	4·70	4·19	45·82	Oct. 12th	2·95	...
38	The Park Estate ...	2·27	3·85	3·45	1·62	5·21	4·15	6·10	5·64	7·97	12·88	6·44	7·72	67·30	Oct. 11th	4·21	195
39	Turfton Hall Estate ...	4·70	4·72	4·43	3·35	9·83	6·24	8.38	7·84	9·11	20·50	9·34	8·88	97·32	Oct. 11th	6.43	...
40	Upper Marli Estate ...	2·71	3·41	3·96	2·23	4·76	4·48	7·25	6·86	6·23	13·05	7·31	4·48	66.73	Oct. 11th	3.35	263
41	Westerhall Agricultural Station ...	1·94	2·25	1·74	.37	3·17	1·94	4·74	4·13	4·88	13·89	5·35	3·99	48.39	Oct. 11th	3·59	179
42	Woodlands Estate ...	1·54	1·94	2·46	1·00	3·64	2·40	3·57	5·10	7·00	9·91	4·13	4·44	47·13	Oct. 11th	2·04	225

APPENDIX II

Showing the overall average yield in pounds dry cocoa per acre for the clonal trials conducted at Mt. Horne Ashenden and Maran Cocoa Stations for the crop year 1958—1959

	Highest Third		Medium			Lowest Third		
Rank	Clone	Yield	Rank	Clone	Yield	Rank	Clone	Yield
1	29	3690	27	71	1768	53	5	1322
2	36	3633	28	53	1768	54	52	1322
3	46	3223	29	19	1762	55	28	1285
4	3	2877	30	66	1750	56	34	1277
5	57	2820	31	14	1706	57	56	1271
6	78	2676	32	7	1688	58	30	1254
7	26	2662	33	54	1675	59	1	1242
8	2	2658	34	68	1672	60	41	1211
9	18	2490	35	69	1629	61	32	1205
10	50	2191	30	4	1624	62	22	1166
11	17	2184	37	51	1609	63	63	1164
12	77	2159	38	61	1601	64	13	1155
13	48	2128	39	60	1597	65	13	1124
14	11	2109	40	27	1584	66	49	1123
15	55	2049	41	43	1573	67	72	1025
16	79	2039	42	67	1527	68	20	1023
17	65	2022	43	42	1514	69	12	934
18	15	1952	44	73	1514	70	45	933
19	64	1939	35	70	1511	71	21	855
20	75	1896	46	62	1494	72	38	840
21	6	1887	47	16	1456	73	25	802
22	76	1868	48	23	1455	74	9	782
23	40	1862	49	10	1435	75	37	752
24	58	1855	50	59	1430	76	47	655
25	44	1820	51	74	1399	77	33	647
26	24	1806	52	39	1380	78	35	635

APPENDIX III

Showing the Propagation Statistics for the Boulogne, Ashenden and Maran Cocoa Stations respectively for the years 1958 and 1959

	Boulogne	Ashenden	Maran	Cumulative Totals 1959	1958
No. of Cuttings set ..	509,641	232,495	179,905	922,041	617,059
No. of Cuttings rooted and stored	276,444	117,183	95,200	488,827	357,819
% Rooting efficiency ..	54%	50%	53%	53%	58%
No. of plants produced during the year	233,705	108,853	72,617	415,175	350,284
Propagative Efficiency ..	46%	47%	40%	46%	50%
Total No. of Plants in storage during the year ..	349,289	143,621	128,366	621,276	447,279
Total No. of failures during the year	28,191	8,175	22,183	58,549	40,273
Percentage mortality ..	8%	7%	17%	10%	13%
No. of plants distributed ..	216,355	87,303	75,001	378,659	